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RECENT LOCAL FAUNAS FROM EXCAVATIONS AT HERVEYS RANGE, KENNEDY, JOURAMA, AND MOUNT ROUNDBACK, NORTH-EASTERN QUEENSLAND

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ABSTRACT

The non-human remains from four excavations carried out by H. Brayshaw in north Queensland are identified. Bone damage noted is interepreted to be caused by smashing, charring, cooking, chewing, rodent gnawing, insect and soil damage, manufacture into tools, and possibly incision.

Human remains suggest cannabilism. Humans included in the deposits are generally juvenile, but do not appear to represent a normal mortality curve. As a result, it is suggested that there was killing with a selective bias. There also appears to be a selective bias in the particular human skeletal elements present.

One animal from the Herveys Range deposit represents a diprotodont marsupial evidently unknown to European zoologists. Other vertebrate species represent those found today in sclerophyl forest, savannah woodlands with rocky areas, and streams. Except for large bats, volant and gliding animals, such as marsupial gliders and birds, are unexpectedly absent. Kangaroos are the most abundant animals represented in the deposits.

As part of a regional archaeological survey four small excavations were undertaken along the coast of the Herbert/Burdekin district, north Queensland, at Herveys Range, Kennedy, Jourama and Mount Roundback (see Fig. 1). A report of these excavations is given in Brayshaw (1977). Lithic material, shells, and bones were found at all four sites; human bone occurred in the deposits at Herveys Range, Kennedy and Jourama, but not at Mount Roundback. Bones recovered from the excavations were placed in bags and taken to Townsville for initial sorting where ribs, isolated mammal vertebra, central portions of limb shafts, and phalanges were removed. The remaining potentially identifiable specimens were sent to Brisbane where they were allowed to soak for a few minutes in water, and then gently cleaned with a damp wad of cotton. This precaution was taken to avoid causing accidental marks on soft bones. The best preserved, most complete and taxonomically diverse specimens were from the Herveys Range deposit and for this reason, were identified first. Bones from the other sites were then compared with the Herveys Range material and, unless they clearly differed, were referred to the same species. The abundant human remains were isolated and analysed separately. A copy of W. Wood's list of identified human material is lodged in the Queensland Museum library. A summary of this report is presented here as an Appendix.

Vernacular and scientific names of mammals follow the usage of Ride (1970). Dental nomenclature is that used by Archer (1978). Fossil kangaroo names are those used by Bartholomai (1975).

Representative specimens are registered in the Queensland Museum fossil vertebrate collection. The remainder of the material will be lodged in the collections of James Cook University. Stratigraphic level designations cited in the text are given as follows: H indicates Herveys Range; C indicates Jourama; E indicates Mount Roundback; F indicates Kennedy; excavation squares in each site are given as roman numerals, e.g. I to XII; depth is indicated by numbers 1 to

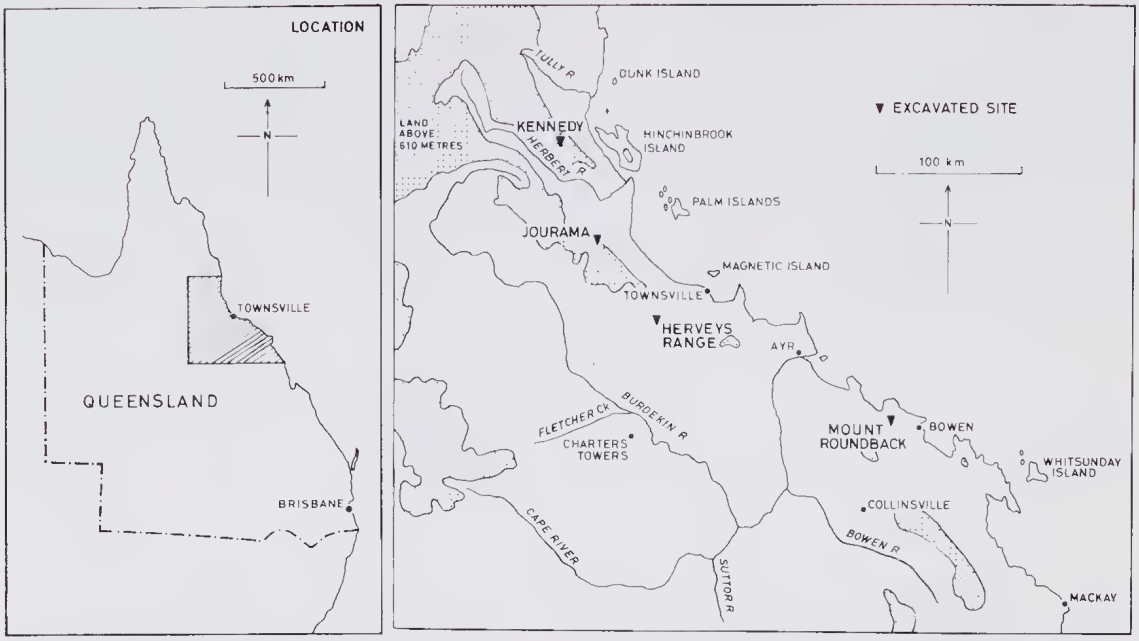

FIG 1. Locations of the Kennedy, Herveys Range, Mount Roundback and Jourama excavations in north-eastern Queensland.

12 where each number represents a 5 centimetre spit or interval. Thus H V 7 indicates the 30–35 cm spit of square V, at Herveys Range.

NON-HUMAN REMAINS

HERVEYS RANGE

Species identified from the Herveys Range excavation are shown in Table 1. In this table, no attempt has been made to itemize the fauna by squares. The numbers represent minimum number of individuals based on the largest number of any common osteological or dental unit. Question marks indicate taxa doubtfully identified.

COMMENTS ABOUT TAXA

FISH: The fish has not been identified. It is invariably represented by broken dentary fragments. Although they are not burned, one fragment may have been cooked. The entire fish would be relatively small, probably smaller than 30 cm in length. Other diagnostic and more abundant fish remains such as vertebrae are easily recognised and their absence suggests fish were not a common food item.

LIZARDS: There are at least two kinds of lizards represented: The Frilled Lizard *(Chlamydosaurus kingii)* and the Blue-Tongue Skink *(Tiligua scincoides)*. Both are represented by broken dentary or maxillary fragments, and in some cases posteranial elements such as pelvis and femur fragments. None show clear evidence of burning, cooking, or tooth marks.

The Eastern Blue-tongue Skink is similar to the Shingle-back Lizard *(Trachydosaurus rugosus)* and has been differentiated here by the fact that its teeth rapidly enlarge in overall size from front to back, the rate of enlargement being much greater than that in the Shingle-back. One Blue-tongue specimen (in H IV 10) is much smaller than the others (in H VI 2) but probably represents a juvenile rather than another taxon. These occurrences of Blue-tongue and Frilled lizards are within the known ranges for the species. Both are recorded from open forest situations.

SNAKES: Vertebral and cranial fragments represent at least one kind of large Python. Regretably, comparison has not been possible with either the Black-headed Python *(Aspidites melanocephalus)* or the Water Python *(Liasis fuscus)*. In comparison with other large pythons *(Morelia spilotes, M. arens,* and *Liasis amethystinus)*, the Herveys Range material including a large isolated right quadrate (in H VII 2) most resembles the Carpet Snake *(Morelia spilotes)*. One of the five identifiable fragments has been burned (a vertebra), another cooked (the right quadrate), and another (vertebra in H VI 1) has been broken and probably chewed. Carpet snakes are known from open forest situations and the Herveys Range occurrence is within the known range for the species.

TABLE 1: FAUNA FROM THE EXCAVATION AT HERVEYS RANGE, 1974

Fauna	Level																	
	Surface	1 (0–5 centimetres)	2 (5–10 centimetres)	3 (10–15 centimetres)	4 (15–20 centimetres)	5 (20–25 centimetres)	6 (25–30 centimetres)	7 (30–35 centimetres)	8 (35–40 centimetres)	9 (40–45 centimetres)	10 (45–50 centimetres) 1455 ±140BP	11 (50–55 centimetres)	12 (55–60 centimetres) 850 ± 125 BP	Min. No. of Individuals	No. of identified fragments	Min. No. of adults	Min. No. of juveniles	No. indeterminable
Fish	1	1	—	—	—	—	1	—	1	—	—	—	—	4	4	?	?	4
Chlamydosaurus kingii	?1	1	—	1	—	—	—	—	—	—	—	—	—	3	3	?	?	3
Tiliqua scincoides	1	1	1	—	—	—	—	—	—	—	1	—	—	4	5	3	1	—
Morelia sp.	—	1	1	—	?1	—	—	—	—	—	—	—	—	3	6	—	—	3
Isoodon macrourus	—	1	?	—	—	—	—	—	—	?1	—	—	—	2	2	1	1	—
Trichosurus cf. *T. vulpecula*	2	3	1	1	1	—	—	1	—	1	—	1	—	11	14	8	0	3
Petrogale cf. *P. penicillata*	4	7	1	—	5	1	1	1	1	?1	?1	?1	—	25	45	16	5	4
Wallabia bicolor	1	2	1	—	—	—	—	—	—	1	—	—	—	5	5	2	1	2
Macropus agilis	2	2	3	1	2	—	3	—	?1	2	?1	—	—	17	33	7	8	2
M. parryi	1	2	—	1	1	—	—	—	—	—	—	—	—	5	6	2	2	1
M. giganteus	1	1	?1	—	—	—	?1	1	—	—	—	—	—	5	10	1	1	3
Small rodent	—	—	1	—	—	—	—	—	—	—	—	—	—	1	1	1	0	0
Mesembriomys gouldii	—	—	—	—	1	—	—	—	—	—	—	—	—	1	1	1	0	0
Macroderma gigas	—	—	—	1	—	—	—	—	—	—	—	—	—	1	1	1	0	0
Pteropus scapulatus	—	—	—	—	1	—	—	—	—	—	—	—	—	1	2	1	0	0
Canis familiaris	2	1	—	—	—	—	—	—	—	—	—	—	—	3	3	2	1	0
Homo sapiens	+	+	+	+	+	+	+	+	+	+	+	+	+			—	—	—
Unknown animal	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1	?	?	1
No. of taxa	11	13	10	6	8	2	5	3	3	5	3	2	1	(bone fragments)				
Squares excavated	5	5	5	5	5	5	5	3	3	3	2	2	1					

BANDICOOTS: The species represented is the Brindled Bandicoot *(Isoodon macrourus)*. It is markedly larger than Cape York specimens of the otherwise similar Brown Bandicoot *(Isoodon obesulus)* and comparable in size to south-eastern Queensland Brindled Bandicoots. The only clearly referable specimen (in H VII 1) is an undamaged dentary. There is nothing to indicate its presence in the deposit is necessarily the result of human activity. The Brindled Bandicoot is known from open forest situations and the present occurrence is within the known range of the species.

BRUSH-TAILED POSSUMS: We have not found a consistant morphological character which separates molar teeth of Brush-tailed Possums *(Trichosurus vulpecula)* from the Bobuck *(T. caninus)*. Because Brush-tailed Possums frequent all habitats except rainforest which is the preferred habitat of the Bobuck, identification of the species could be an important aspect in the interpretation of palaeoecology. However, the specimens from Herveys Range are not inconsistant with interpretation as Brush-tailed Possums and in view of the presence of open forest in the area today, and the absence of any other rainforest animal remains in the deposit, the simplest conclusion is that the specimens probably do represent Brush-tailed Possums rather than Bobucks.

Brush-tailed Possum remains were present on most stratagraphic levels. Every specimen is broken, most show evidence of having been cooked, but none are burned. Some have fractures or marks which suggest chewing (e.g. in H VII surface). Most specimens represent young adults. There were no juveniles or pouch-young. Herveys Range is within the known distribution of Brush-tailed Possums.

ROCK-WALLABIES: There are differences of opinion about the number of species of Rock-wallabies *(Petrogale)* in north Queensland. On the basis of Ride's (1970) remarks about distribution, the species in the area of Herveys Range today is likely to be the Brush-tailed Rock-wallaby *(P. penicillata)*. Other authorities suggest additional forms (some representing taxa included by Ride in *P. pencillata*) occur in or near this area including *godmani*, *puella*, and *inornata*. We have attempted to differentiate the molar teeth of these forms using modern Queensland Museum specimens and could find no consistant way of separating small samples referable to Godman's Rock-wallaby *(P. godmani)* from large samples referable to the Brush-tailed Rock-wallaby *(P. penicillata)*. Because all forms of *Petrogale* occupy similar rocky habitats, it probably does not make any significant difference which species is represented in terms of paleoecological interpretation. Nevertheless, the only Rock-wallaby specimens in the Queensland Museum from the Townsville area represent the Brush-tailed Rock-wallaby, and they are very similar to the Herveys Range material. For these reasons the Herveys Range specimens are regarded as *Petrogale* cf. *P. penicillata*. Rock-wallabies are the most common animal in the deposit. Every one of the 45 specimens is smashed, cooked or burned. One dentary (in H VII Surface) has tooth marks on it that suggest a non-human carnivore. Most dentaries have I_1 broken off at the base such that the enamel face projects as a hard transverse edge beyond the dentine. This suggests the dentaries were intended to be, or were actually used as, tooth engravers (Mr K. Akerman, pers. comm.). One left dentary (in H III 5) is possibly abnormal. Although basically similar to other Rock-wallaby specimens, the last molar has a peculiar post-link and a posterior cingulum, characters otherwise unknown in Rock-wallabies. It may represent a supernumerary fifth molar (Archer 1975). Another specimen (in H VII 1), a right dentary, has what appears to be an impacted P_3 projecting down into the alveolus for the missing RI_1.

SWAMP WALLABIES: Swamp Wallabies *(Wallabia bicolor)* are uncommon in the deposit being represented by only five specimens. Of these, three have premolars and are positively identified. Two others are referred with some confidence, but not certainty, on the basis of molar morphology. The fifth specimen is an isolated I_1 and, although only doubtfully referred to this species, cannot be matched with any other wallabies identified from this deposit. All specimens are smashed but none are clearly cooked or burned. One of the dentaries has I_1 broken off in the manner described above for Rock-wallabies and may have been intended for use as a tooth engraver. The Herveys Range occurrence for Swamp Wallabies is within their known range and habitat requirements.

AGILE WALLABIES: Although called a wallaby (Ride 1970), Agile Wallabies *(Macropus agilis)* are very large kangaroos and the most common large animal in the Herveys Range deposit, being represented by at least 17 individuals and 33 skull or dental fragments. All specimens are smashed, cooked or burned. All dentaries have I_1 missing

or broken off in the fashion described above for Rock-wallabies. Almost half of the specimens whose age has been determined represent juveniles (P3 hadn't erupted). This occurrence of Agile Wallabies is within their known range and habitat requirements.

WHIPTAILS: Whiptails *(Macropus parryi)* sometimes also called Pretty-face Wallabies, are larger than Rock-wallabies but smaller than Agile Wallabies. They are as rare in the Herveys Range deposit as the comparable sized Swamp Wallabies. All specimens are broken, but none are obviously cooked, burned or chewed. Whiptails have a molar morphology similar to Agile Wallabies but are immediately distinguished by their much smaller and bicuspid P_3. One Herveys Range specimen (in H IV Surface), the proximal end of an ulna, has been identified as a Whiptail because it exactly matches ulnae of Whiptails and is clearly dissimilar to ulnae of all other marcopodid species known from the Herveys Range deposit. One of three dentary specimens (in H VII 1) is only tentatively identified as a Whiptail. It differs from other Herveys Range specimens and Queensland Museum material in possessing a very narrow anterior cingulum and, judging by the roots, relatively large P_3. Unless it represents a taxon otherwise unrecognized from this deposit, it probably represents an extreme variation in Whiptails. The Herveys Range occurrence of Whiptails is within their known distribution and accords with their habitat requirements.

GREAT GREY FORESTER: This is the largest species *(Macropus giganteus)* represented. Unfortunately, all of the very large kangaroo remains are too incomplete to identify with any certainty and it is possible that Antilopines *(M. antilopinus)* or Euros *(M. robustus)* are represented among the unidentified material. The only upper molar has a small but well-developed forelink and well-developed buccal accessory cuspules in the mid-valley. The first character favours identification as the Great Grey, because the vast majority (there are exceptions) of Antilopines and Euros lack a well-developed forelink. The second character is ambiguous, being present in some fossil species (e.g. *Macropus (Osphranter) pan* and *M. (O.) woodsi)* of the group of kangaroos including Antilopines and Euros, but evidently not in these two modern species of the group. For the present, the remains are referred to the Great Grey Forester, but with reservations. All of the specimens are broken but only one (in H VII Surface) is obviously also burned. Great Grey Foresters are likely to occur today in the Herveys Range area, as it is within their known range and habitat requirements. Because Rock-wallabies were (or are) so abundant, it is probably reasonable to assume the habitat would also suit Euros.

UNKNOWN ANIMAL: The single most intriguing fragment from the Herveys Range deposit is a left dentary fragment in H III (5). It appears to be mammal because the tooth alveoli are deep and completely unlike those of fish or reptiles examined. The absence of small incisor alveoli anterior to the large caniniform alveolus suggests it is not a polyprotodont marsupial. It also resembles no known placental mammal. In all probability it represents a diprotodont marsupial somewhat similar to the Green Ringtail Possum *(Pseudocheirus archeri)* which has a very short diastema and a relatively steeply inclined I_1. The Herveys Range specimen differs from these in completely lacking a diastema and in being larger. There is little point in speculating further about its affinities because it is such a small fragment. However, it certainly suggests the presence of an as yet undiscovered (by European zoologists) north Queensland mammal. Whatever it represents, it was evidently used by the Aborigines as a food because, like all the other bones in this deposit, it has been thoroughly smashed.

SMALL RODENTS: One broken specimen (in H VI 2) retaining only M_3, appears to be a small pseudomyine rodent. It clearly does not represent a species of *Rattus*. There is no evidence that it was cooked.

BLACK-FOOTED TREE-RAT: This very large rodent *(Mesembriomys gouldii)* may be represented by an isolated LI_1. The distribution of the tooth enamel appears to differentiate it from the north Queensland Giant White-tailed Rat *(Uromys caudimaculatus)* and the common Water Rat *(Hydromys chrysogaster)*. Although it is similar to the Gaint White-tailed Rat, the tooth enamel in Tree-rat specimens in the Queensland Museum extends farther around the buccal side of the tooth. This represents a significant range extension southwards for the Black-footed Tree-rat, although it is just within the range of the Gaint White-tailed Rat. Because the identification is based on such limited material, we are hesitant to regard it as anything other than a tentative identification, and one which requires substantiation by much better material. The

Black-footed Tree-rat normally inhabits woodland savannah while the Giant White-tailed Rat inhabits rainforest. This is added support for the possibility that the tentative identification is correct.

GHOST BAT: Only one specimen (in H V 3) represents this large carnivorous bat *(Macroderma gigas)*. There is nothing to indicate that it was cooked. Its presence in the deposit suggests but does not necessarily mean that it was eaten by Aborigines. Ghosts Bats are nocturnal, extremely alert, and do not hesitate to fly during the day if disturbed. This would probably make them very difficult animals to catch. Ride (1970) considers that their diurnal roosts are invariably in caves or tunnels. The Hervey's Range occurrence is within their known modern range.

RED FLYING FOX: This relatively small Flying Fox *(Pteropus scapulatus)* is represented by one broken specimen (in H VII 4) which suggests the species was eaten, albeit infrequently. Like the Ghost Bat it is nocturnal but roosts in trees and probably would be an easier species to catch. One specimen (in H VI surface), a left dentary, lacks the M_3 normally found in this species. Only one modern specimen in the Queensland Museum shows the same condition. This distribution record is within the known range and choice of habitat for the species.

DINGO: Dingoes *(Canis familiaris)* are represented by only three teeth. Two of these appear to represent broken adult canines, one of which (in H VI Surface) may have been burned. The third tooth, undamaged, appears to have been an incompletely erupted LdP_4, thus presumably broken out of a dentary rather than naturally dropped out or shed. The two adult canines are split dorso-ventrally, a type of fracture that usually occurs after a tooth is heated, or allowed to age over a long period in a skull. If the Dingoes had broken the teeth during life, we would expect the break to have been transverse along the horizontal plane. Dingoes are known from almost all areas of Australia.

ABORIGINES: Aboriginal remains are spread throughout the deposit and the great majority are thoroughly broken. Some are also burned. Of particular interest is the symphysis of a very small child which is thoroughly burned as well as broken. Details of the human remains are given below.

BONE DAMAGE

Damaged bones noted may be grouped into seven categories: broken bones; bones clearly used as implements; burned bones; cooked bones; decalcified bones; soil or insect damaged bones; tooth-marked bones.

BROKEN BONES: Of over 150 identifiable bone fragments, less than a few dozen of the smallest such as tarsals are intact. In addition to identifiable fragments, there are hundreds of smaller fragments too smashed to be identified.

Very few of these show gouges suggesting points of violent impact. From this we conclude either that the bones were crushed individually with a blunt instrument, such as a flat rock, or were crushed while still part of the whole carcase, the skin and flesh thereby protecting the bones surfaces from impact damage.

Some fragments appear to have had tooth crowns deliberately smashed off the roots (e.g. the cheekteeth of a kangaroo maxillary fragment in H VII 10). Almost all kangaroo dentaries have I_1 broken off in a manner suggesting the dentaries were intended for use as tooth engravers (see above). Alternatively or concordantly the incisor tips may have been used elsewhere, perhaps as ornaments or points for spears. The very low number of isolated lower incisor crowns compared with the high number of dentaries lacking this tooth, is evidence for this possibility.

OBVIOUS BONE IMPLEMENTS: Two bone fragments (one in H VI 1, and one in H VII 4) were obviously used as awls, needles, or spatulas. Both may have been manufactured from the dense part of a kangaroo fibula.

BURNED BONES: Burning is evidenced by the black, charred texture of a bone surface. Fragments that do show burning are normally thoroughly burned. It is possible that some bone fragments encountered while eating may have been tossed back into the fire. Although it seems highly unlikely that carcases would be cooked until charred as a preparation for eating, some bones forming extremities such as teeth or phalanges could have been burned well prior to the flesh being cooked.

COOKED BONES: Interpretation of alteration in a bone due to cooking is less easy than recognition of alteration due to burning. Bones have been interpreted here as cooked if they show a particular brown colouration such as might result

if they were contacted by hot oils or other by-products of heated flesh. One humerus fragment (in H VII 5) has two distinctly charred ends. The central portion however, is brown and merges gradually into the black of the charred ends. This is the brown colour regarded in other bones to indicate alteration due to cooking.

Other processes could produce a brown colour in the bone, such as acids in the soil in which the bones are burned. No attempt was made here to distinguish these possible causes.

DECALCIFIED BONES: A few bone fragments (such as one in H VI Surface) have a very soft whitish texture and can easily be scratched with a fingernail. Possibly these bones were charred and subsequently bleached. Alternatively, they may have passed through the alimentary tract, either of an Aboriginal or a Dingo. Bone fragments of this type are very uncommon in the deposit.

POSSIBLY INSECT-DAMAGED BONES: One dentary fragment (in H VII 1) of an Agile Wallaby has pits on its surface which suggest either corrosion or the activities of invertebrates, such as beetle larvae. Burned, softened bone is often subject to insect destruction. Damage of this sort has been observed on bones from other similar deposits.

TOOTH-MARKED BONES: Tooth marks are relatively uncommon on bones from the Herveys Range deposit compared with those from the Jourama deposit. Three sorts have been recognized: fine, sharp, conical depressions or scratches possibly produced by Dingoes or children (e.g. in H VII surface); blunter, deeper conical depressions possibly produced by adult Aboriginals with blunter canines (e.g. in H VIII 5); marks clearly attributable to rodents (e.g. in H VII 4). In the case of rodent gnawing, the implication is that at least some bones were left unburned on the living surface. The particular bone gnawed by rodents had also been smashed and apparently chewed by another carnivore such as a Dingo.

The absence of more extensive chewing suggests the possibility that food was relatively abundant in the Herveys Range area than in the Jourama area.

HORIZONTAL DISTRIBUTION OF BONES IN THE DEPOSIT

It was evident that for any given level (i.e. surface, level 1, and so on) bones were more abundant towards the rear of the shelter. On the surface level, H III (the farthest from the shelter back, and directly under the drip line) had no identifiable fragments; H IV had 2; H V had 6; H VI had 4; and H VII (rear of shelter) had 17. On level 1, H III had 4; H IV had 1; H V had 5; H VI had 8; and H VII had 26. This suggests either that Aboriginals centred their activities at the rear of the shelter to avoid high temperatures or rain or they may have centred their activities forward of the rear and tossed unwanted bone fragments to the rear of the shelter, possibly to keep them out from under foot.

KENNEDY

Unlike the material from the Herveys Range deposit, very few of the bones from the Kennedy deposit are identifiable. Accordingly the non-human fauna is discussed as a whole.

The only two recognizable taxa are as follows: fish (unidentified), levels 1, 2 and 4; Frilled Lizard *(Chlamydosaurus kingii),* level 5, 7 and possibly 1. All bones are smashed or merely broken and several are clearly burned. Other types of bone damage include corrosion pits (in F II 2), and decalcification (in F II 7). Comments relative to this kind of damage are noted above in reference to the Herveys Range deposit. The presence of only the Frilled Lizard, rather than the Eastern Blue-tongue lizard which is the more abundant of the two at Herveys Range, is puzzling but the samples are too small for this difference to have statistical significance. The abundance of lizard rather than mammal species is perhaps more meaningful, and is an even more radical departure from the Herveys Range deposit, but we do not know what it means. The relatively greater abundance of fish indicates either a proportionately greater amount of time spent fishing, or else a greater abundance of fish. But again, it is impossible to interpret the true significance of these site differences because of the small size of the Kennedy sample.

MT ROUNDBACK

As in the case of the Kennedy site, the identifiable non-human bone fraction of the Mt Roundback deposit is small.

There are six identifiable non-human taxa: molluscs (pelecypod, type unidentified), 5–10 cm, represented by a small shell fragment; amphibians (at least one large species, possibly a large hylid), surface, represented by isolated limb bones; snake (possibly an elapid?), 5–10 cm, represented by a small vertebra; Brush-tailed Possum *(Trichosurus vulpecula,* but see applicable comments about taxonomy given above for the Herveys Range

specimens), surface and 5–10 cm, represented by an isolated lower incisor and a dentary fragment; Rock-wallabies (*Petrogale* sp.), 10–15 cm and 20–25 cm, represented at least by maxillary and dentary fragments; and a large Kangaroo, probably a Euro *(Macropus* cf *M. robustus),* 5–10 cm, represented by at least an isolated upper molar.

The only departure from species also present in the Herveys Range deposit is the possible Euro. Identification of the single large tooth is based on the fact that although there is a forelink, it is very tiny, a condition common to Euros but not Great Grey Foresters which normally have a well-developed forelink. Many other bone fragments in the Mt Roundback deposit represent very large kangaroos, but because they are mostly postcranial fragments, they are unidentifiable.

Bone damage

All bones are broken, with rare exception. Some, but not all, of the frog bones on the surface are undamaged. None of the bone fragments on the surface, but some within the deposit are burned. One pelvic fragment (in E6, 15–20 cm) appears to have been decalcified and/or burned. Another pelvic fragment (in E7, surface) shows corrosion pitting of the sort noted in the Herveys Range deposit. One bone fragment (in E4, surface) shows damage caused by teeth, but there are no clear indications of what carnivore was responsible. Kangaroos will even chew bones though they don't leave conical tooth depressions near the broken ends.

Jourama

The non-human remains from the Jourama deposit represent few taxa, and none otherwise unrepresented in the Herveys Range deposit. However some aspects of bone damage and the abundance of Aboriginal remains in this site make it unique.

Taxa

There are four identifiable non-human taxa: mollusc (peleeypod, cyrenid, *Batissa* or *Cyrena,* which occurs in the lower reaches of tropical rivers), level 3; Rock-wallaby (*Petrogale* sp.), possibly represented by specimen on level 2; Agile Wallaby *(Macropus agilis),* level 4 and possibly level 2; and the Dingo *(Canis familiaris),* level 1 and a specimen not allocated to a level.

In terms of composition, this assemblage more cosely resembles that from Herveys Range than from Kennedy.

Bone damage

The material from this deposit is unique in that almost half of the level samples contain bone fragments showing clear evidence of tooth marks. In many of these chewed specimens (e.g. in C III 4, C III 5, and C III 6), the entire surface of the bone fragment is disfigured by gouges, fractures and tooth impressions, even to the extent of disfiguring the edges of the fragmented bone. Nothing, unfortunately, indicates whether the carnivores were Aborigines, Dingoes or both. We suspect Aborigines because nothing like this kind of damage is present in a large sample of bones deliberately fed to captive Dingoes (an experiment carried out for us by Mr A. Boorsboom, Queensland University). Of course, much depends on how chewing behaviour changes as a function of hunger. In the case of the experimentally fed Dingoes, the animals, although hungry, were certainly not starving. One dense limb bone fragment (in C III 4) shows a unique kind of damage. It has what appears to be a deep incision that is clearly not attributable to rodents, Dingoes or Aboriginal teeth. It superficially resembles a wedge-shaped incision present in a fossil bone from Mammoth Cave, Western Australia (Archer, Merrilees and Crawford, in preparation) which has been attributed to Aboriginal activity. In the present case, no attempt has yet been made to find evidence of sawing or chipping. An alternative cause of the damage could conceivably be spalling, although a percussion point is not obvious. Other types of bone damage in this deposit are of the same kind as noted for bones in the Kennedy and Mt Roundback deposits.

HUMAN REMAINS

Herveys Range

On the basis of the sample identifications provided by Dr W. Woods, there are 13 juveniles and 17 adults represented. There appears to be a heavy mortality between the ages of 10 to 12 years. There is no clear evidence for very old individuals. Adults that have been aged are generally middle-aged. Only one infant was noted. Many human bones, including juveniles, show charring and scratch marks. Virtually no human bones except some hand and foot elements are unbroken. These facts suggest that the human remains represent a food eaten by the inhabitants of the Herveys Range shelter. The nature of the bone breaks and charring is similar to that shown by the non-human bones in the same deposit.

DISPROPORTIONATE REPRESENTATION: In most levels, humans are represented mainly by foot bones, hand bones, skull fragments and teeth. Pelves are very rare and limb bones uncommon, although the latter may be at least partially represented by numerous unidentifiable bone splinters. The calcaneum and astragulus are also generally absent. Reasons for this disproportionate representation are not obvious. Possibly some human carcases were dismembered elsewhere, and the only portions brought to the site were wrists and hands, lower parts of feet and entire heads. Although unlikely, it is difficult to otherwise explain the representation.

DISEASE: Only arthiritis was noted.

JOURAMA

All samples considered, there are 15 juveniles and 9 adults represented. Of the juveniles there are two mortality peaks, one between the ages of 3 to 5, and another, the larger of the two, between 8 to 13. The adults for which age estimates have been made are young adults, except one middle-aged or old individual. One possibly new born infant is present. All except some of the smallest bones are broken, some including juveniles and adult bones are charred, and others marked. Smashed teeth, periotic bones and calcanea indicate considerable force involved in breakage. One bone shows what appears to be traces of red pigment, suggesting possible ceremonial use of this human bone.

Curious concentrations of bone fragments were encountered during excavation. These include at least broken limb, vertebral, foot, mandibular and cranial elements but no given cluster represented a whole individual. The almost vertical orientation of some long limb bone fragments in these clusters suggests the remains were either placed in excavated pits, perhaps as burials, or fell into steep-sided crevices in the shelter's surface. It is obvious from photographs taken at the time that some of these bones were deposited as small fragments while others show fractures developed or widened in situ which resulted in their removal as yet smaller fragments. Some skulls had complete, undistorted cranial vaults. Because these were heavily invested with plant roots, they were removed in pieces during excavation.

REPRESENTATION: There is some unequal representation generally of recognizable limb bones, and commonly of pelves. Foot and hand bones, and teeth are common.

MT ROUNDBACK

Only three levels produced identifiable human remains. In the entire deposit, five individuals are represented: two unaged juveniles; an adult; a middle-aged male; and an unaged individual. Some bones are charred or marked, and all except some small bones are broken. Representation of bone elements is reasonable even considering the small number of samples.

KENNEDY

Human material was only identified in one level, and represents one unaged individual.

COMPARISONS OF HUMAN REMAINS BETWEEN SITES

The two well-represented sites, Herveys Range and Jourama, provide the only really meaningful data for intersite comparisons.

HUMANS AS FOOD: In general, the Herveys Range deposit has a much lower percentage of human bone, in terms of all bone present, than Jourama. This suggests, assuming humans were a food source, the Jourama people ate more people. However, the assumption that all the human remains represented food for the Jourama people is questionable because of the evidently intact nature of some crania. If these particular individuals were eaten, why weren't their heads smashed in order to obtain the brains? The apparent absence of entire skulls, but obvious abundance of skull fragments, many of which were burned, at Herveys Range does not conflict with the notion that the humans in that deposit were a source of food.

POSSIBLE INTERMENTS: At Jourama the presence of bone clusters of dominately human bone, and at least some intact skulls, suggests burial or at least emplacement in pits, a phenomenon not obviously present in the Herveys Range deposit. The non-cranial bones were, however, almost all broken prior to burial, and at least one of these broken bones has what appears to be traces of red pigment. Possibly the bones or carcases were broken, cooked or burned and some bones decorated for ritualistic purposes prior to burial in pits. Whatever the reason, this aspect of the Jourama deposit appears to differ from that of Herveys Range.

AGE OF HUMANS REPRESENTED: In the Herveys Range deposit there are more adults than juveniles represented, while at Jourama there are far more juveniles than adults represented. The

reasons for this difference are obscure and much would depend on the reason the humans were part of each deposit. In both deposits it seems unlikely that the ages of the individuals could represent the structure or mortality curves of the population unless some bias were involved, such as selective killing. If they did represent a mortality curve, surely more infants would be represented. The Jourama deposit revealed only one possibly neonate; there were none from Herveys Range.

GENERAL REMARKS CONCERNING ALL FOUR SITES

Habitats Indicated

The faunas from all four sites suggest they were obtained from sclerophyl forest or savannah woodland, with rocky areas and streams. Even the Kennedy fauna, although extremely impoverished, contains the Frilled Lizard which (Cogger 1975) only inhabits dry sclerophyl forests and woodlands.

The Herveys Range deposit contains the highest proportion of mammal remains and the lowest proportion of fish or shells. This suggests it was farther from water than the other three sites.

Bias in Species Representation

With a few exceptions, the majority of arboreal and volant species likely to be in the vicinity of all four sites are unrepresented in the deposits. These include three genera of gliders, pigmy possums, most bats and all birds. In fact the only arboreal marsupial represented, the Brush-tailed Possum, is also known to spend a considerable amount of time on the ground. This suggests the Aborigines were either hunting more in the open savannah areas, or else had few skills enabling them to recover arboreal animals. The total lack of birds is even more puzzling because many spend a considerable amount of time on the ground.

Also totally missing are the dasyurids, the native mainly terrestrial carnivores which range from a mouse to a cat in size. Over 10 kinds could have been available to them and it is not at all clear why they aren't represented in the deposit.

Some of these absences may be explained by chance sampling of excavation sites. More extensive examination would be expected to yield additional taxa.

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Dr Wally Woods (University of Queensland) supplied the age analysis and identification of the human remains which formed the basis of the Appendix. Mr A. Boorsboom contributed Dingo-chewed bones for comparison. Mr K. Ackerman kindly collected and provided bones from Aboriginal campsites from north-western Australia. Mr A. Easton took the photographs.

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APPENDIX

Summary of Human Remains Identified by W. Woods, with Comments

Herveys Range

Surface (21 fragments): At least two individuals: one adult, one juvenile. Charring of skull and post-cranial fragments. Most parts of skeleton are represented except pelvis and limbs. Dominance of hand, foot and skull fragments. Most bones broken. Only one tooth present.

Spit 1 (36 fragments): At least four individuals: baby 6–9 months; juvenile 10–11 years; middle aged adult. Charring and smashing of teeth and bones, including those of juveniles. Missing are pelvis, femur, tibia, ulna. Dominance of hands, feet, skull and teeth. Some teeth of juveniles (VII) have roots which are charred, suggesting they may have been smashed out of skulls before being burned.

Spit 2 (30 fragments): At least three individuals: child approximately 3 years; child 10–12 years; adult (age ?). Charring and smashing of bones — particularly noteworthy is smashed tympanic region which is very dense part of skull requiring considerable force to break. Missing are almost all limb bones except fibula, pelvis, sacrum, and scapula. Dominance of hand and foot elements, skull fragments, teeth and some vertebrae.

Spit 3: At least two individuals: an adult, possibly male, of 30+ years; a juvenile (age ?). Charring only noted on adult skull fragment (HVII), and a juvenile scapula fragment (HVII). Adult had arthritis in one foot. Missing are most portions of pelvis, and major limb bones. Dominance of foot and hand bones, tooth and skull fragments.

Spit 4 (22 fragments): At least two individuals: a middle aged adult; juvenile. Charring noted only on two juvenile skull fragments (HVII). Small samples but still no remnants of limb bones, pelves, scapulae, sacra. Dominance of skull fragments, teeth, foot and hand bones.

Spit 5 (1 fragment): At least one individual: a ?juvenile male. No charring noted. One zygomatic (skull) bone only of human remains identified.

Spit 6 (3 fragments): At least two individuals: possibly a juvenile of approximately 12 years; one adult. No charring noted. Rib, tooth and toe bone, only three fragments.

Spit 7 (10 fragments): At least one individual: one adult. Small sample, but no burning noted. Fragmentation common. Some marking on tibial fragments. Missing are pelvis, femur, fibula, arm (except hand elements) and most of axial skeleton. Present are skull fragments, scapula fragment, hand elements, tibial fragments, and atlas fragment.

Spit 8 (3 fragments): At least two individuals: a juvenile approximately 12 years; an adult (age ?). Small sample, but no charring noted. Present are finger, vertebra fragment and spine of scapula.

Spit 9 (8 fragments): At least two individuals: a juvenile approximately 6 years; an adult (age?). Charring of skull, vertebra. Missing are pelvis, limbs, feet, hands; only represented by skull fragments, isolated teeth, vetebral fragment.

Spit 10 (4 fragments): At least two individuals: a juvenile (age?); an adult (age?). No charring noted. Only represented by fragments of skull, foot and femur.

Spit 11 (5 fragments): One adult (age?). No charring noted. Represented only by fragments of rib, femur, skull and one trapezoid.

Spit 12 (8 fragments): At least two adults (age?). No charring noted. Represented are fragments of rib, foot bones, vertebrae, and some hand bones.

Spit 13 (16 fragments): At least two adults (age?). Charring of skull fragment. Missing are all limbs, pelvis, axial skeleton (except skull). Dominance of foot and hand elements.

Spit 14 (16 fragments): At least one individual: an adolescent or young adult. No charring noted. Missing are limbs (except hands and feet), pelves, sacrum. Dominance of foot and hand elements, and less so, skull elements.

Spit 15 (15 fragments): Possibly a single adult. No charring noted. Missing are all major limb bones except femur, pelvis, sacrum, scapula and skull. Dominance of hand and foot elements. For the first time a calcaneum (fragments) is represented.

Jourama

Surface (1 fragment): One individual (age?). No damage noted. One right cuboid only present.

Spit 1 (11 fragments): At least two individuals: one juvenile 8–10 years; one adult (age?). Charring of a long bone fragment. A broken periotic bone indicates considerable force involved in smashing skull. Some long bones were evidently cut, or at least have cut marks. Missing are most bones but representation includes skull, teeth, hand and at least one long bone.

Spit 2 (32 fragments)	At least four individuals: juvenile approximately 4 years; juvenile approximately 8 years; juvenile approximately 13 years; adult in early twenties. Charring of juvenile skull fragments and a mandible. A juvenile ulna and radius show heat marks (cooking without charring?) and scratches. Missing are pelves and possibly limb bones of adult. Some limb bone fragments are present but, except for juvenile radius and ulna, are evidently unidentifiable. Dominant are isolated teeth.
Spit 3 (115 fragments)	At least four individuals: a juvenile approximately 10 years; a juvenile approximately 16 years; a subadult female; and an adult (age?). Charring noted on some skull fragments only, i.e. uncommon. Breakages other than normal smashing includes scratch marks on ileum of young female; on rib fragments; juvenile long bones; metatarsal has piece removed (?); metacarpal with scratch marks; scratches on adult femur; scratch marks on rib fragments and on young adult mandible fragment. One mandible fragment suggests teeth were removed (or naturally lost?) from bone after death. Calcaneum is smashed, a feat taking considerable force. All elements represented by at least one fragment, but scarce are pelvic fragments, vertebrae and limb bones. Common are isolated teeth, foot and hand bones.
Spits 3 & 4 (32 fragments)	At least two individuals: a child of approximately 8 years; a juvenile of approximately 10 years. No charring observed. Most long bones show scratches. One long bone shows traces of ?red pigment. There are no obvious missing elements, except there are no hand or foot bones — the reverse of the usual situation.
Spit 4 (77 bones — nearly 100 fragments)	At least two individuals: a child of approximately 10–11 years; an adult (age?). Charring noted on mandible fragments; long bone fragments; a patella; skull fragment. Splitting or scratching noted on rib fragments, long bone fragments, etc. A cuboid and calcaneum are broken, considerable force being required. Some teeth are also broken — also requiring considerable force. Most elements are represented, including pelves. Dominance of hand and foot bones, and isolated teeth.
Spit 5 (87 + fragments)	At least five individuals: an infant (possibly just new born); a juvenile of approximately 4–5 years; a juvenile of approximately 11–12 years; two young adults. Charring noted in skull fragments and long bone fragments. Most bones are represented except pelvis and identifiable long bones, except femur — some fragments of long bones may represent others. Dominance of isolated teeth only.
Spit 5 north end (20 + small fragments)	Probably a single adult male. A talus is charred. Scratch marks noted on fragments of femur, clavicle and ribs. Representation reasonable. Missing are pelvis, arms and hands, although scapula and clavicle present. Legs and feet dominate.
Spit 6(a) (46 + many fragments)	At least three individuals: a juvenile approximately 3–4 years; an adult male (age?); an adult female (age?). Charred bones include scapula fragments and long bone fragments. Splitting and/or scratching noted on femur fragment, long bone fragments, also on fragments of pelvis and scapula. Most bones are represented except arms (hands represented). Several pelvic fragments present, including juvenile and adult.
Spit 6(b) (60 + many fragments)	At least three individuals: two juveniles; a middle aged male. Charring is not specificially noted but many of the bones are said to show evidence of heat exposure. Scratching and/or splitting are noted in tibial, fibular, femoral, radial, ulnar and clavical fragments. One vertebra shows advanced arthritis. Representation is reasonably even — no obvious imbalance.
Spit 7 (6 fragments)	At least two individuals: a juvenile of approximately 4–5 years; and an adult (age?). No charring noted. Scratch marks on maxillary fragments. Sample small, so unequal representation not surprising. Fragments all cranial and mandibular.
KENNEDY	
Spit 9 (F11)	Not clearly more than one individual (age?). Fragments of right pubis and ribs, also foot bones present.